WE CLAIM:

1. An apparatus for producing a diffraction pattern in an optical fiber, the apparatus comprising:

solid state laser means for producing a fourth harmonic laser beam having a wavelength in the range of approximately 230 to 250 nanometers; and

means for using the fourth harmonic laser beam to produce the diffraction pattern on the optical fiber.

2. The apparatus of claim 1, wherein the solid state laser means comprises:

active laser means; and

means for pumping the active laser means.

3. The apparatus of claim 1, wherein the solid state laser means comprises:

means for producing a second harmonic beam from a fundamental beam; and

means for producing a fourth harmonic beam from the second harmonic beam.

4. The apparatus of claim 1, wherein the solid state laser means operates in continuous wave mode.

5. The apparatus of claim 1, wherein the solid state laser means further comprises a Q-switch.

6. The apparatus of claim 2, wherein the active laser means comprises a crystal doped with a rare earth element.

7. The apparatus of claim 2, wherein the active laser means comprises diode laser means.

8. The apparatus of claim 2, wherein the active laser means comprises a doped garnet crystal.

9. The apparatus of claim 2, wherein the pumping means comprises means for producing an IBC laser beam.

10. The apparatus of claim 3, wherein the second harmonic means comprises means for minimizing beam walkoff.

11. The apparatus of claim 3, wherein the fourth harmonic means is selected to minimize beam walkoff.

12. The apparatus of claim 3, wherein the solid state laser means further comprises:

first resonator means; and

active laser means, wherein the active laser means and the second harmonic means are disposed within the first resonator means.

13. The apparatus of claim 3, wherein the solid state laser means further comprises:

first resonator means;

second resonator means; and

active laser means, wherein the active laser means is disposed within the first resonator means and the second harmonic means is disposed within the second resonator means.

14. The apparatus of claim 4, wherein the solid state laser means further comprises:

first resonator means;

second resonator means;

third resonator means;

active laser means for producing a fundamental beam;

second harmonic means for producing a second harmonic beam from the fundamental beam; and

fourth harmonic means for producing a fourth harmonic beam from the second harmonic beam, wherein the active laser means is disposed within the first resonator means, the second harmonic means is disposed within the second resonator means and the fourth harmonic means is disposed within the third resonator means.

15. The apparatus of claim 5, wherein the Q-switch is operated to produce the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.

16. The apparatus of claim 5, wherein the Q-switch is operated to produce the fourth harmonic beam with pulse widths in the range of 50 to 500 nanoseconds.

17. The apparatus of claim 6, wherein the active laser means comprises a mixed garnet.

18. The apparatus of claim 6, wherein the active laser means comprises an Nd:YAG laser operated on a transition at approximately 946 nanometers.

19. The apparatus of claim 6, where the rare earth element is chosen from the list of neodymium and ytterbium.

20. The apparatus of claim 7, wherein the diode laser means comprises a VCSEL which generates a fundamental beam having a wavelength in the range of 920-1000 nanometers.

21. The apparatus of claim 7, wherein the diode laser means comprises an InGaAs diode laser which generates a fundamental beam having a wavelength of 920-1000 nanometers.

22. The apparatus of claim 7, wherein the solid state laser means further comprises:

first resonator means; and

doubler means for producing a second harmonic beam from a fundamental beam emitted by the diode laser means, wherein the diode laser means and the doubler means are disposed within the first resonator means.

23. The apparatus of claim 8, wherein pumping means comprises an IBC diode bar laser which emits a pump beam having a wavelength in the range of approximately 802 to 812 nanometers.

24. The apparatus of claim 11, wherein the fourth harmonic means comprises a CLBO crystal.

25. The apparatus of claim 22, wherein the solid state laser means further comprises:

second resonator means; and

fourth harmonic means for producing a fourth harmonic beam from the second harmonic beam, wherein the fourth harmonic means is disposed within the second resonator means.

26. The apparatus of claim 24, wherein a wavelength of the active laser means is selected such that the CLBO crystal operates in a noncritically phasematched state.

27. An apparatus for producing a diffraction pattern in an optical fiber, the apparatus comprising:

a solid state laser for producing a fourth harmonic laser beam having a wavelength in the range of approximately 230 to 250 nanometers, wherein the solid state laser comprises:

an active laser medium; and

a pump for pumping the active laser medium; and

a Bragg writer for using the fourth harmonic laser beam to produce the diffraction pattern on the optical fiber.

28. The apparatus of claim 27, wherein the solid state laser operates in continuous wave mode.

29. The apparatus of claim 27, wherein the solid state laser further comprises:

a doubler crystal for producing a second harmonic beam from a fundamental beam emitted by the active laser medium; and

a quadrupler crystal for producing a fourth harmonic beam from the second harmonic beam.

30. The apparatus of claim 27, wherein the solid state laser further comprises a Q-switch.

31. The apparatus of claim 27, wherein the active laser medium comprises a crystal doped with a rare earth element.

32. The apparatus of claim 27, wherein the active laser medium comprises a diode laser.

33. The apparatus of claim 27, wherein the active laser medium comprises a doped garnet crystal.

34. The apparatus of claim 27, wherein the pump comprises an IBC diode bar laser.

35. The apparatus of claim 27, wherein the active laser medium comprises a mixed garnet.

36. The apparatus of claim 27, wherein the active laser medium comprises an Nd:YAG laser operated on a transition at approximately 946 nanometers.

37. The apparatus of claim 28, wherein the solid state laser further comprises:

a first resonator;

a second resonator;

a third resonator;

an active laser medium for producing a fundamental beam;

a doubler crystal for producing a second harmonic beam from the fundamental beam; and

a quadrupler crystal for producing a fourth harmonic beam from the second harmonic beam, wherein the active laser medium is disposed within the first resonator, the doubler crystal is disposed within the second resonator and the quadrupler crystal is disposed within the third resonator.

38. The apparatus of claim 29, wherein the doubler crystal is selected to minimize beam walkoff.

39. The apparatus of claim 29, wherein the quadrupler crystal is selected to minimize beam walkoff.

40. The apparatus of claim 29, wherein the quadrupler crystal comprises a CLBO crystal.

41. The apparatus of claim 29, further comprising a first resonator, wherein the active laser medium and the doubler crystal are disposed within the first resonator.

42. The apparatus of claim 29, further comprising:

a first resonator; and

a second resonator, wherein the active laser medium is disposed within the first resonator and the doubler crystal is disposed within the second resonator.

43. The apparatus of claim 30, wherein the Q-switch is operated to produce the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.

44. The apparatus of claim 30, wherein the Q-switch is operated to produce the fourth harmonic beam with pulse widths in the range of 50 to 500 nanoseconds.

45. The apparatus of claim 30, wherein the Q-switch is operated to produce the fourth harmonic beam with peak power in the range of 500 to 2000 watts.

46. The apparatus of claim 31, where the rare earth element is chosen from the list of neodymium and ytterbium.

47. The apparatus of claim 32, wherein the diode laser comprises a VCSEL which generates a fundamental beam having a wavelength of 920-1000 nanometers.

48. The apparatus of claim 32, wherein the diode laser comprises an InGaAs diode which generates a fundamental beam having a wavelength in the range of 920-1000 nanometers.

49. The apparatus of claim 32, wherein the solid state laser further comprises:

a first resonator; and

a doubler crystal for producing a second harmonic beam from a fundamental beam emitted by the diode laser, wherein the diode laser and the doubler are disposed within the first resonator.

50. The apparatus of claim 33, wherein pumping means comprises an IBC diode bar laser which emits a pump beam having a wavelength in the range of approximately 802 to 812 nanometers.

51. The apparatus of claim 39, wherein the CLBO crystal is noncritically phasematched.

52. The apparatus of claim 49, wherein the solid state laser further comprises:

a second resonator; and

a quadrupler crystal for producing a fourth harmonic beam from the second harmonic beam, wherein the quadrupler crystal is disposed within the second resonator.

53. A method for producing a diffraction pattern in an optical fiber, the method comprising the steps of:

pumping an rare-earth doped crystal with a diode laser to generate a fundamental beam;

producing a second harmonic beam from the fundamental beam;

irradiating a CLBO crystal with the second harmonic beam to produce a fourth harmonic beam having a wavelength in the range of approximately 230 to 250 nanometers, with the wavelength of the fundamental beam chosen such that the CLBO crystal operates noncritically phasematched; and

using the fourth harmonic beam as an input beam to a Bragg writer for producing the diffraction pattern on the optical fiber.

54. The apparatus of claim 53, further comprising the step of producing the fourth harmonic beam at a pulse rate in the range of 5,000 to 20,000 Hz.

55. The apparatus of claim 53, further comprising the step of producing the fourth harmonic beam with pulse widths in the range of 50 to 500 nanoseconds.

56. The apparatus of claim 53, further comprising the step of producing the fourth harmonic beam with peak power in the range of 500 to 2000 watts.